



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/622,001	07/17/2003	Uziel Landau	AMAT/2601.R02/CPI/COPPER/	2266

44257 7590 10/19/2006

PATTERSON & SHERIDAN, LLP
3040 POST OAK BOULEVARD, SUITE 1500
HOUSTON, TX 77056

EXAMINER

BELL, BRUCE F

ART UNIT PAPER NUMBER

1746

DATE MAILED: 10/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/622,001	Applicant(s) LANDAU, UZIEL	
	Examiner Bruce F. Bell	Art Unit 1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-89 is/are pending in the application.
- 4a) Of the above claim(s) 62-66 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☐ Claim(s) 1-61 and 67-89 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-61 and 67-89, drawn to an apparatus and method for electrochemical plating, classified in class 205, subclass 96.
 - II. Claims 62-66, drawn to fluid processing cell, classified in class 118, subclass 716.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are directed to an apparatus and method for electrochemical plating, and a fluid processing cell, respectively. The group II invention can be a cell for PVD, CVD, sputtering, or ion beam deposition from the instant claims as set forth, whereas the group I invention is specific to electroplating only.

2. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

Newly submitted claims 62-66 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: A fluid processing cell for a semiconductor process does not have to be an electroplating cell, it can be an etching cell, a PVD, CVD, sputtering or ion beam deposition cell which may have different structural attributes than that of an electroplating cell.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for

prosecution on the merits. Accordingly, claims 62-66 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 53-61, 67-77 and 89 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The claims set forth above make reference to a fluid basin not described in the instant specification. Applicant is requested to keep the terms used in the original disclosure consistent in the instant claims.
3. Claims 36, 37, 53-61, 67-77 and 89 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 36 and 37 lack antecedent basis for the phrase "plating cell".

Claims 53-61 and 67-77 and 89 are vague and indefinite with respect to the phrase "fluid basin". It is unclear as to what this feature is from the instant claims as set forth. Does applicant mean container body as set forth in the instant specification?

Claim 73 is vague and indefinite with respect to how the fluid basin having a fluid outlet is configured to receive a substrate. Does not appear from applicants instant specification, that the outlet is configured to receive the substrate but instead the substrate holder is configured to receive the substrate and that is found above the container body. Correction and/or clarification are requested.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 30, 32-35, 48, 52, 78-88 are rejected under 35 U.S.C. 102(e) as being anticipated by Ritzdorf et al (US 2002/0022363).

Ritzdorf et al disclose a processing station for electroplating a metal such as copper onto a semiconductor wafer. See paragraph [0020]. An electroplating bowl assembly includes a cup assembly which is disposed within a reservoir container. See paragraph [0021]. The bottom wall of the cup assembly is connected to a rise tube and a fluid inlet line is disposed within the riser tube. The fluid inlet line is secured with the processing bowl assembly of the processing station and the inlet line is made of a conductive material like titanium to conduct electrical current to the anode as well as to supply fluid to the cup. See paragraph [0022]. Process fluid is provided to the cup

through the fluid inlet line and proceeds therefrom through the fluid inlet openings. Plating fluid then fills the chamber through the openings as supplied by a plating fluid pump. See paragraph [0023]. The outflow of plating liquid from the chamber is returned to the reservoir where it is treated with plating chemicals to be used again. See paragraph [0025]. A diffuser plate is disposed above the anode for providing a more even distribution of the flow of the fluid plating bath across the surface of the wafer. Fluid passages are provided over all or a portion of the diffused plate to allow fluid communication therethrough. The height of the diffuser plate within the cup assembly may be adjustable using height adjustment mechanisms. See paragraph [0027]. The processing head holds a wafer within the processing chamber. The head is constructed to rotate the wafer within the chamber. The processing head includes a rotor assembly having a plurality of wafer engaging contact fingers that hold the wafer against features of the rotor. Fingers are adapted to conduct current between the wafer and a plating electrical power supply and may be constructed in various configurations. See paragraph [0029]. An electrochemical process to electroplate a copper metallization layer on a wafer at a thickness sufficient to at least fill the trenches and/or vias is disclosed wherein the wafer is exposed to the plating bath for a time without plating power, and then a low current initiation is provided between the anode and the wafer. A direct current with a current density of 3.2 mA/cm^2 is utilized. The low current process may proceed for a time of 30 seconds. See paragraph [0040-0041]. After the low current cycle, a high current plating process is started wherein plating occurs in a forward only pulsed voltage or current, or a forward and reverse voltage or current is

used. The cathode current density of $20\text{mA}/\text{cm}^2$ is used with a current waveform that is direct current, forward pulsed, or reversed pulsed. See paragraph [0042].

The prior art of Ritzdorf et al anticipates the applicants instant invention as shown by the disclosure to Ritzdorf et al above with respect to the applicants instant claims as set forth. The diffuser plate of Ritzdorf et al is considered to be a porous fluid flow adjustment member and is positioned across the container between the anode and the open portion where the wafer is held and awaiting plating. The method for electrochemically plating a metal onto the plating surface of the wafer by applying a first and second current density is also set forth in Ritzdorf et al and the current density ranges of both the first and second current density is the same as that in the instant invention.

Therefore, the prior art of Ritzdorf et al is anticipated as set forth above.

Oath/Declaration

6. The reissue oath/declaration filed with this application is defective because it fails to identify at least one error which is relied upon to support the reissue application. See 37 CFR 1.175(a)(1) and MPEP § 1414.

7. The reissue oath/declaration filed with this application is defective because none of the errors which are relied upon to support the reissue application are errors upon which a reissue can be based. See 37 CFR 1.175(a)(1) and MPEP § 1414.

8. The reissue oath/declaration filed with this application is defective (see 37 CFR 1.175 and MPEP § 1414) because of the following:

The reissue oath or declaration filed with this application is defective because it fails to describe the actual errors in the patent, i.e., it fails to particularly specify the "defects" in the specification or drawings, 37 CFR 1.175 (a)(2); and/or it fails to distinctly specify the "excess or insufficiency" in the claims, 37 CFR 1.175 (a) (3).

The actual errors that led to the filing of this re-issue have not been set forth in the oath and/or declaration.

9. Claims 1-61 and 67-89 are rejected as being based upon a defective reissue oath/declaration under 35 U.S.C. 251 as set forth above. See 37 CFR 1.175.

The nature of the defect(s) in the oath/declaration is set forth in the discussion above in this Office action.

A certificate of correction was issued in U.S. Patent No. 6,261,433 on May 28, 2002. Per MPEP 1411.01, applicant is requested to make these changes by incorporation into the reissue application without underlining or bracketing. Applicant's in their preliminary amendment submitted July 17, 2003, amended the specification, with the errors corrected by the certificate of correction having been underlined. Correction is requested.

Allowable Subject Matter

10. Claims 1-29 are allowable over the prior art of record.

11. Claims 31, 38-47 and 49-51 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.


12. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record fails to teach and/or suggest a flow adjustment member being made of a ceramic or the backside substrate engaging member being configured to urge the substrate plating surface against the cathode contact member or the apparatus having at least one auxiliary electrode in fluid communication with the plating solution.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bruce F. Bell whose telephone number is 571-272-1296. The examiner can normally be reached on Monday-Friday 6:30 AM - 3:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on 571 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BFB


Bruce F. Bell

Application/Control Number: 10/622,001

Page 9

Art Unit: 1746

June 11, 2006

Primary Examiner
Art Unit 1746